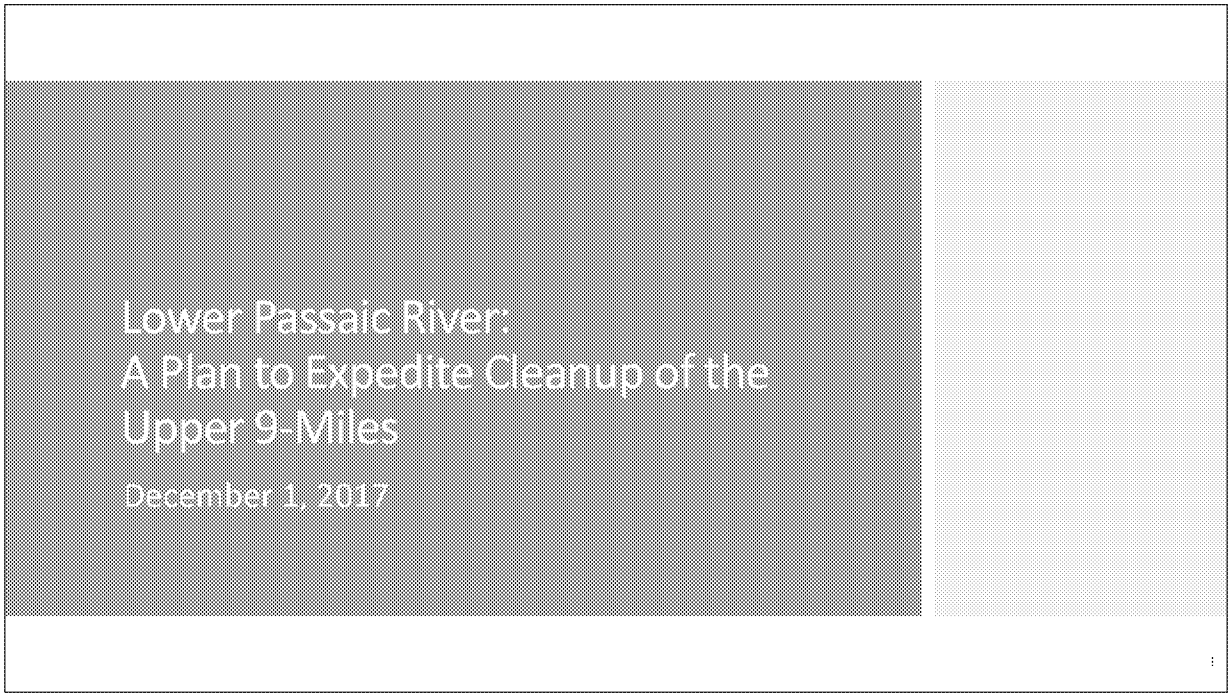
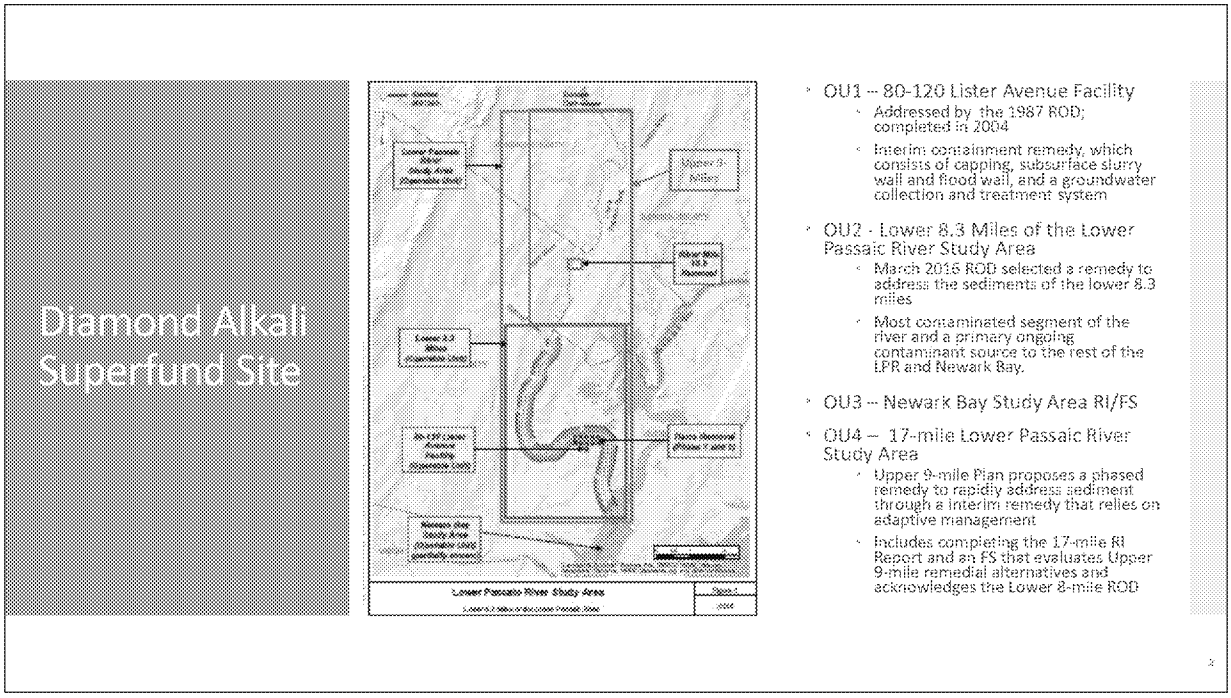
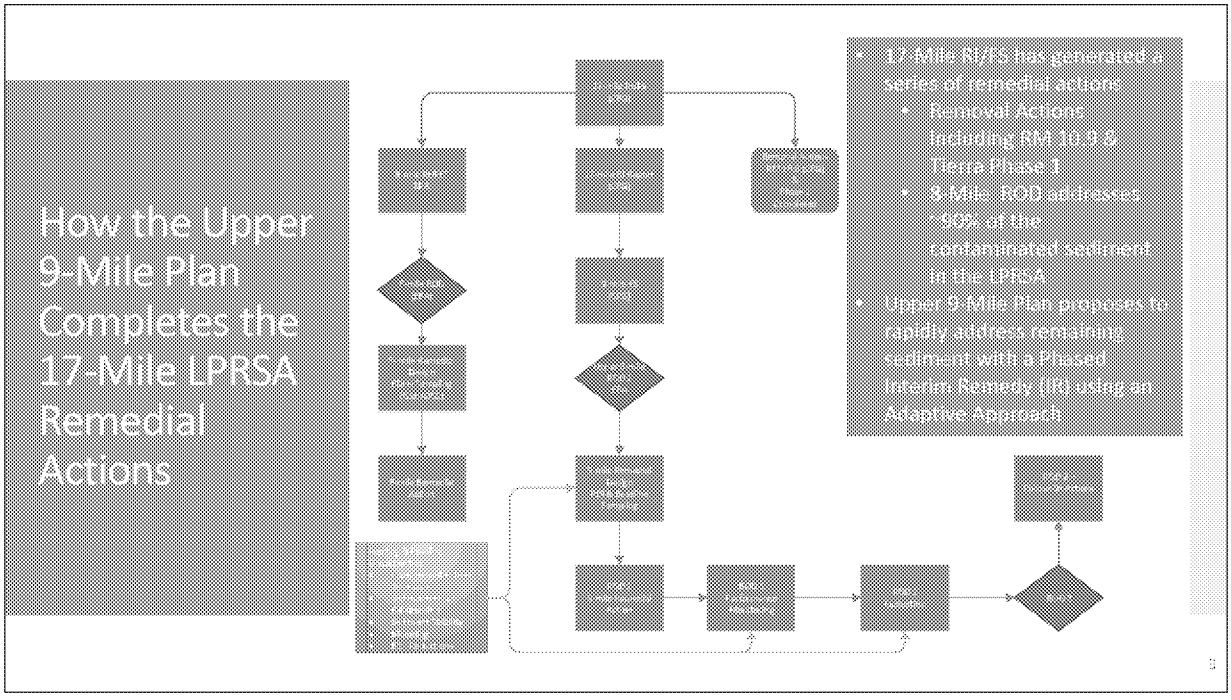


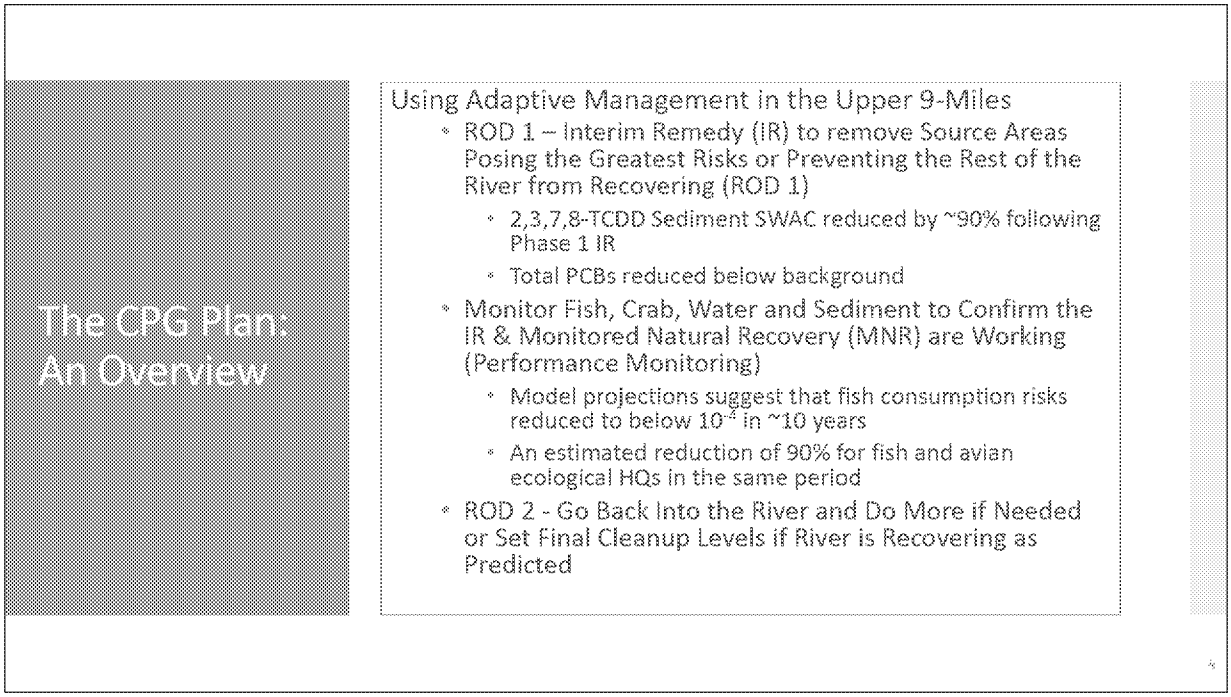
CSTAG Presentation



There are 4 OUs associated with the Diamond Alkali Superfund Site
OU4 is entire 17-mile LPRSA including the Upper 9-miles
OU2 is the Lower 8-miles of the LPRSA and has been addressed by the March 2016 ROD
Upper 9-Mile Plan would address the remainder of the 17-mile LPRSA employing a Phased Remedy using EPA's Adaptive Management process



17-Mile LPRSA RI/FS has resulted in a series of remedial actions including 2 removal actions, 8-mile ROD
Upper 9-mile Plan will address the remainder of the 17-Mile LPRSA through an active Interim Remedy, Post-Remedy Recovery with Performance Monitoring employing adaptive management. If RAOs are met then, a final ROD will issued. If RAOs are not met, the additional actions will be evaluated and implemented



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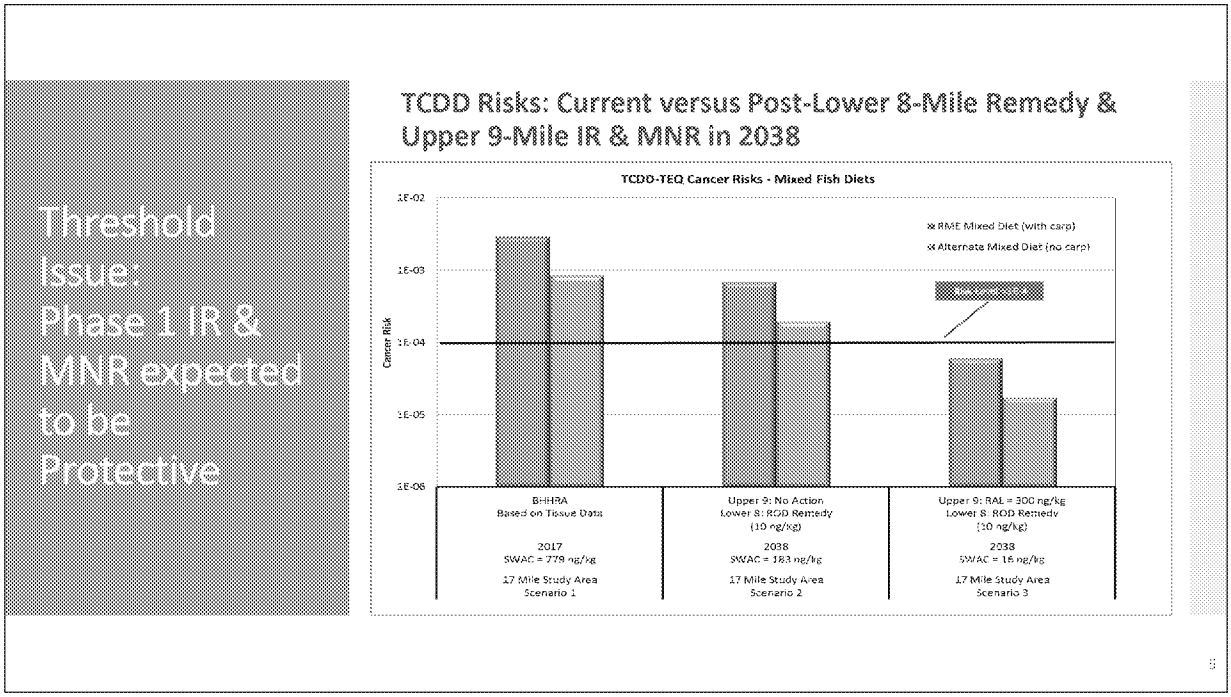
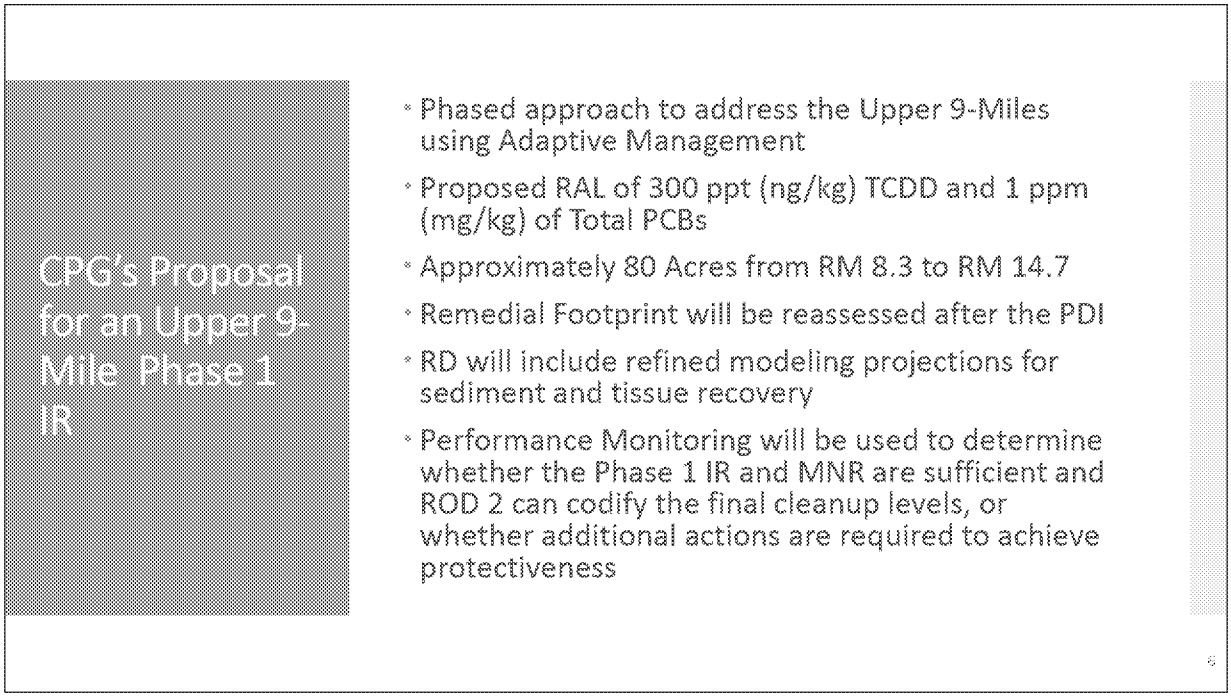


This figure shows the projected reduction in dioxin fish consumption human health risk from implementing the Lower 8 Miles ROD remedy and the Phase I interim remedy proposed for the Upper 9 Miles.

The basis of these estimates will be discussed later in the presentation, but the key point is that implementing the combined remedies for the Lower 8 and Upper 9 Miles is projected to achieve fish consumption cancer risks that are below the NCP target risk level of 10-4.

The above estimates reflect mixed fish species exposed to a whole-river sediment average; they will be revised to reflect the exposure likely from the species specific home range when the models are finalized.



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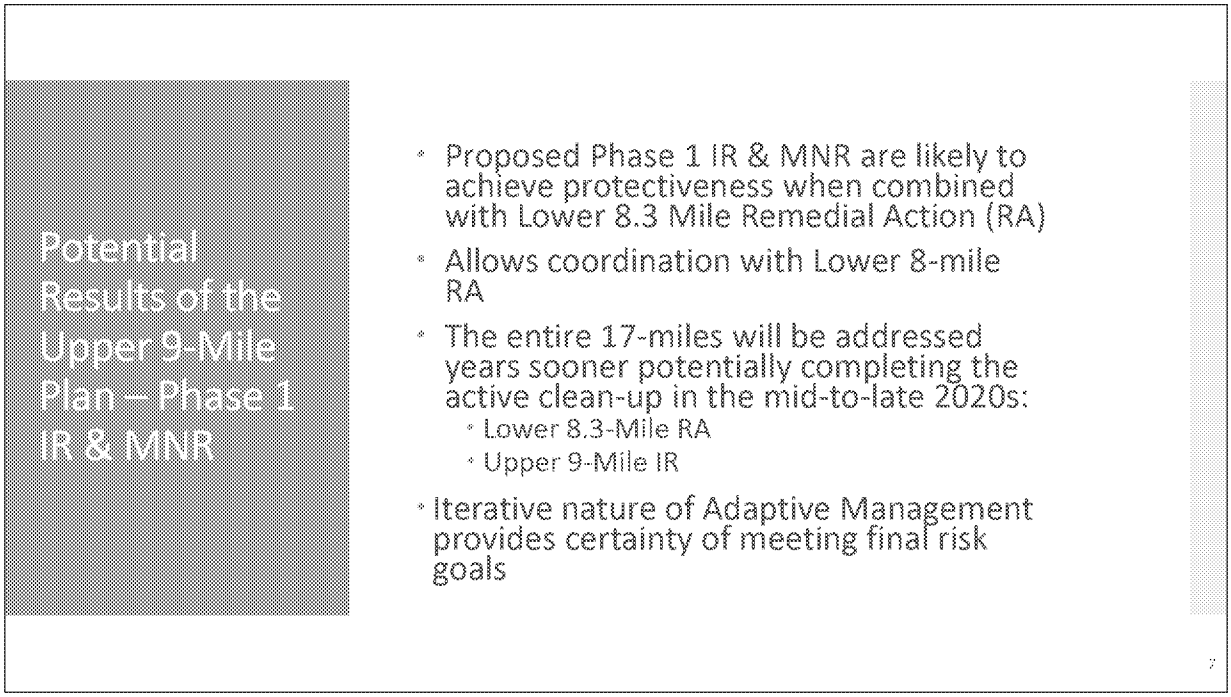

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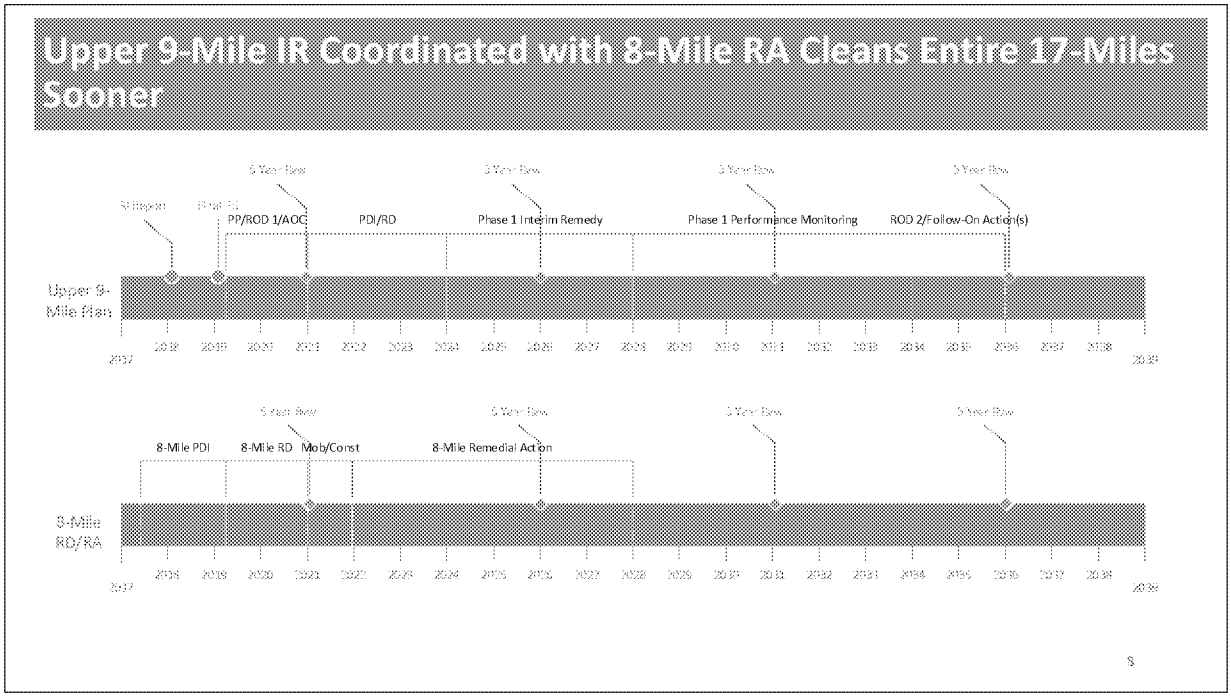

The Upper 9-Mile Plan will expedite the cleanup of the entire LPRSA and coordination with the Lower 8-Mile ROD provides the opportunity to complete the active remediation in the mid-to-late 2020s

Conceptual Site Model Elements Regarding Sediment Recovery Provide Guidance for Phase 1 Interim Remedy

- At locations of fine sediment with surface concentrations much higher than on depositing particles:
  - Net deposition responsible for the COPCs being there in the first place has likely slowed or stopped
- At locations of fine sediments with surface concentrations matching those of depositing particles:
  - Net deposition likely has continued
- At locations of coarser sediments, which typically have concentrations lower than those of depositing particles:
  - Concentrations likely reflect the net result of erosion and deposition of the fine fraction
  - Erosion and deposition at these locations will cause concentrations to be impacted by the concentrations on depositing particles

9

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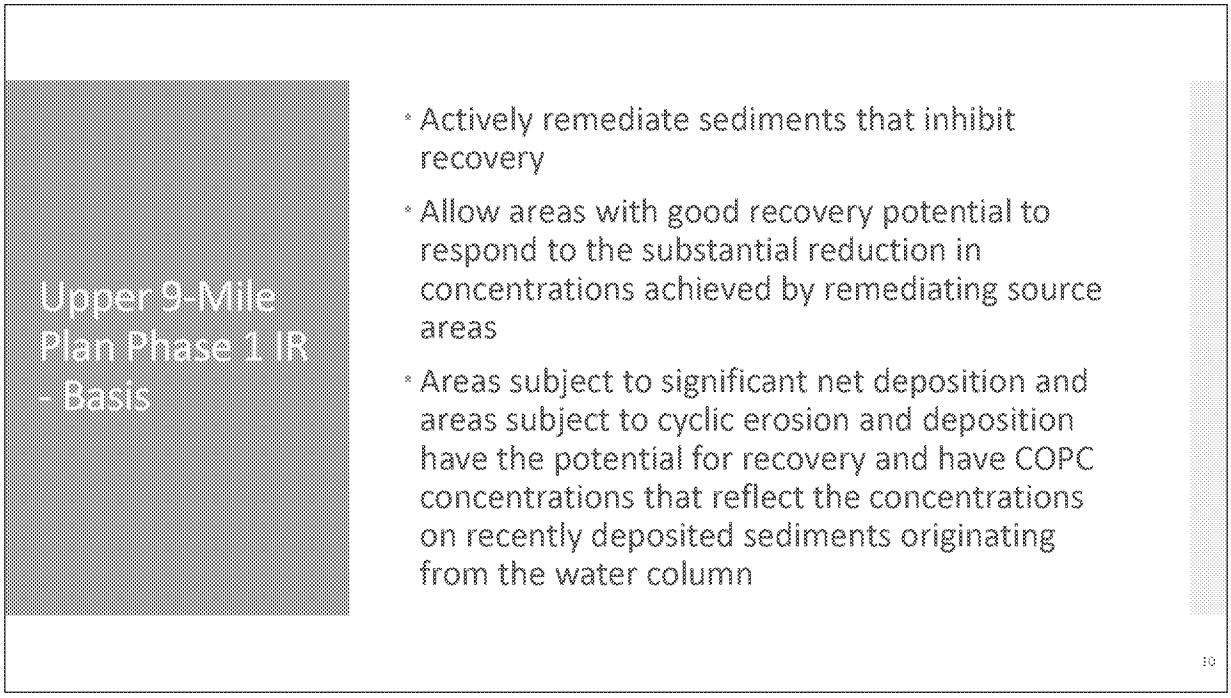

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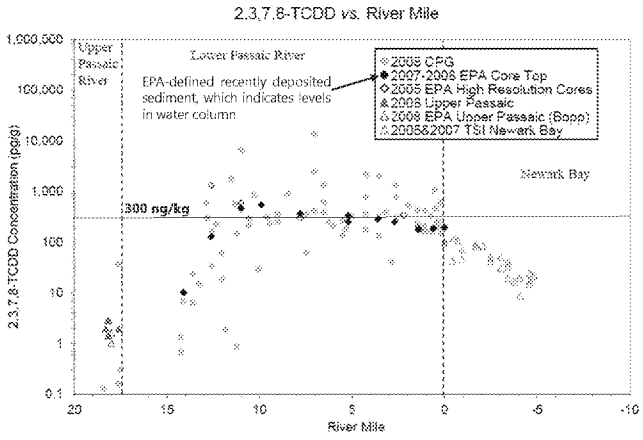
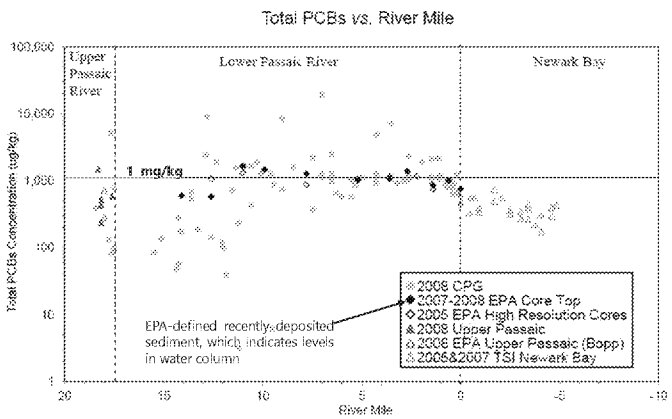
Depositing Particle 2,3,7,8-TCDD Concentrations Roughly 200 ng/kg to 400 ng/kg



"...2,3,7,8-TCDD concentration in recently-deposited sediments vary less than a factor of 3 from RM 2 to RM 12 (note in blue diamonds on the upper diagram in Figure 4-3)." – FFS RI Report at Page 4-3.

Water Column 2,3,7,8-TCDD Particulate Concentrations at RM 10.2 (from HY-PWCM) 180 ng/kg and 340 ng/kg

Depositing Particle Total PCB Concentrations Roughly 0.7 to 1.5 mg/kg



Water Column Total PCB Particulate Concentrations at RM 10.2 (from HydroQual)
0.7 mg/kg and 0.9 mg/kg

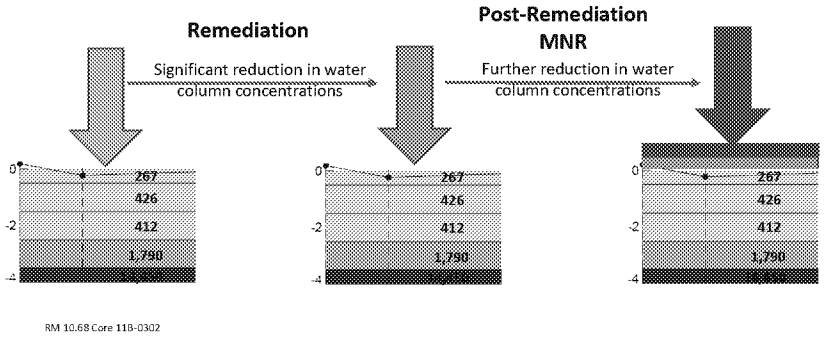
Evidence of Recovery in Lower 8 Mile Depositional Areas

Plot shows the arithmetic average calculated in natural log space with +/- two standard errors for data collected between RM 1 and RM 7. The 1995 dataset includes data collected between 1995 – 1999 and the 2010 dataset includes data collected between 2005 – 2013. Differences between 1995 and 2011 bathymetry surveys were used where available. Outside the coverage of the 2011 bathymetry data, differences between 1995 and 2007 bathymetry surveys were used.

Knowledge of Recovery Mechanisms Allows Prediction of Post-Remediation Recovery

- Burial via net deposition
  - Applies to most areas with surface sediment 2,3,7,8-TCDD concentrations in the range of 200 to 400 ng/kg
- Exchange of fine sediment component of coarse sediments via alternating deposition and erosion
  - Applies to areas with surface sediment 2,3,7,8-TCDD concentrations less than 200 ng/kg

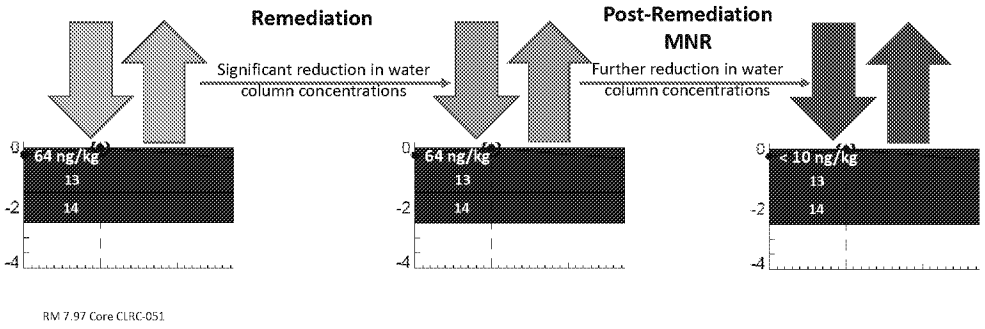
Recovery Via Net Deposition



RM 10.68 Core 11B-0302

Recovery Via Erosion and Deposition in Coarse Sediments

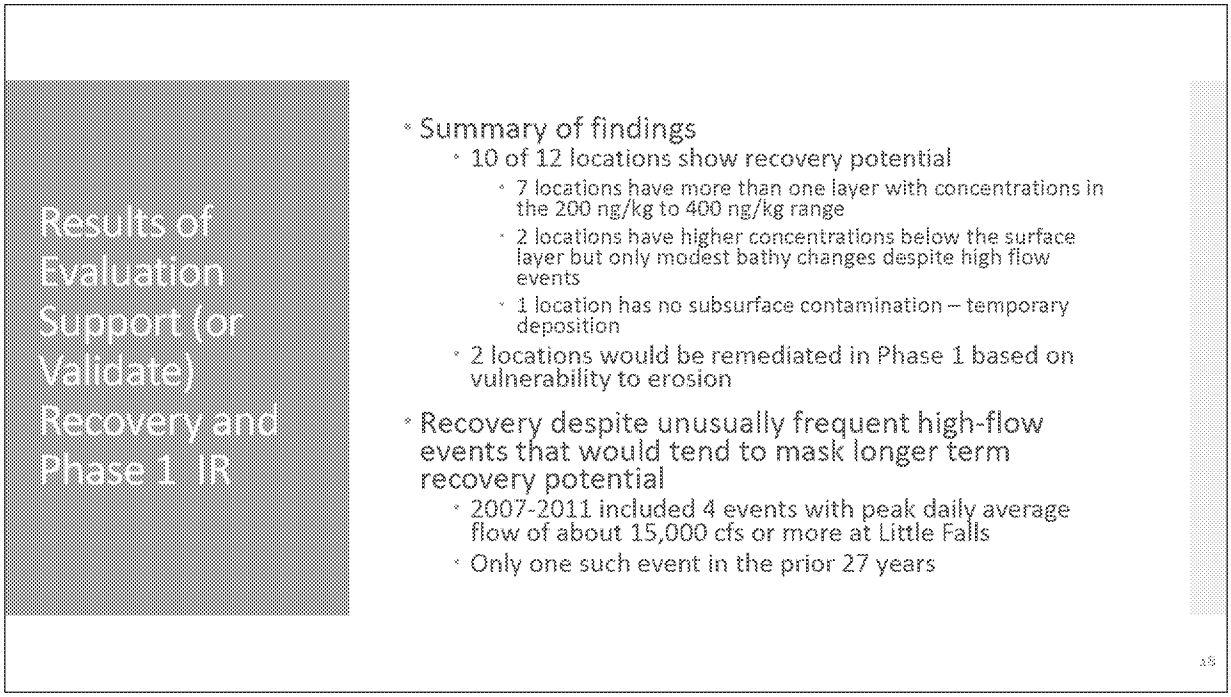
Location mapped as Gravel and Sand



RM 7.97 Core CLRC-051

Recovery Potential at Locations with 2,3,7,8-TCDD of 200 ng/kg to 300 ng/kg was Evaluated to Validate Recovery Mechanisms

- 12 such cores collected between RM 8 and RM 12.5
- Indicators of recovery potential
  - More than one layer with concentrations in the 200 ng/kg to 400 ng/kg range indicative of deposition
  - No indication of significant erosion at the location
    - Recognizing that Hurricane Irene occurred in 2011 (90 year event)
  - Absence of subsurface contamination – location of temporary deposition



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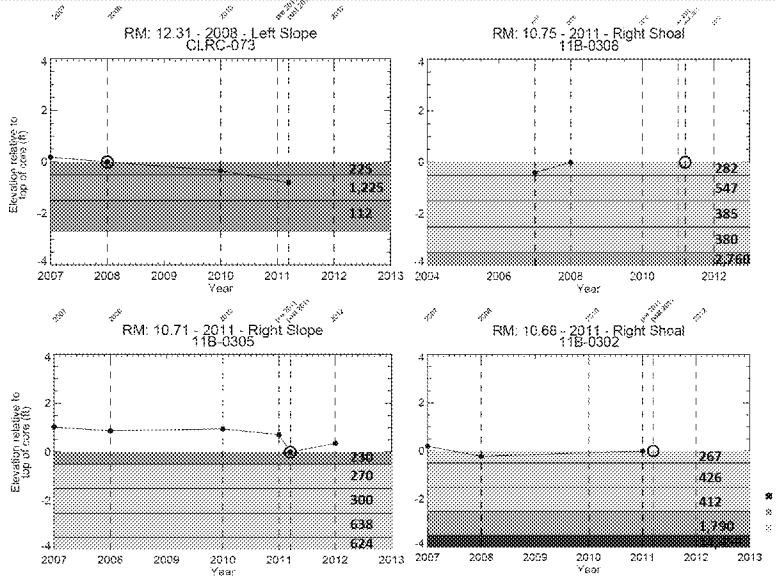
Bathymetry Temporal and Vertical 2,3,7,8-TCDD Profiles for Cores With 200 ng/kg to 300 ng/kg in the Top 0.5 ft

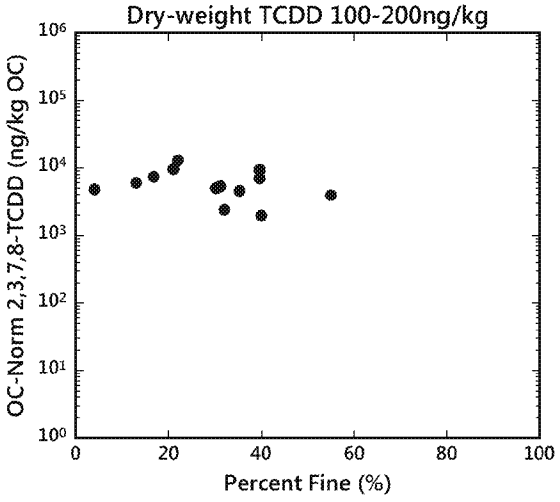


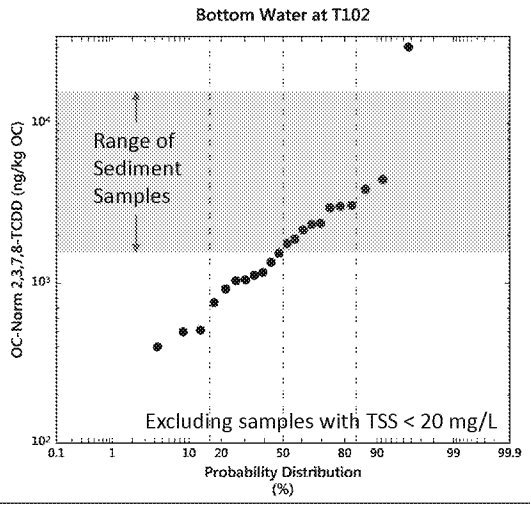
- Three of the 7 cores with evidence of ongoing deposition because of multiple layers in the range of water column particulates
- One (upper left) of two cores that is vulnerable to erosion and would be targeted for removal

Note:
- lines and points indicate core surface elevation relative to elevation in the year of collection
- Numbers are ng/kg in each layer

2,3,7,8-TCDD Conc. (ng/kg)
- 0 - 100
- 100 - 250
- 250 - 500
- 500 - 1000
- 1000 - 10000
- 10000 - 158@250
- Indicates core sampling year
- Mudline Elevation

Locations with 100-200 ng/kg of 2,3,7,8-TCDD Exhibit Similar Carbon-Based Concentrations that Suggest a Close Connection to Water Column Particulates





Evaluation of Remediation and its Effectiveness Conducted Using Concentration Distributions Predicted by Geostatistics

- Kriging used to quantify uncertainty in interpolated concentrations
- Conditional simulation used Kriging uncertainty estimates to generate 100 maps of sediment COPC distributions, each of which honor the data and the spatial correlation estimated from the data
- A single map designated as CS37 has been agreed for modeling purposes to be used to estimate the magnitude of remedial foot print triggered by the RALs and the concentration reductions that would be attained by that remediation

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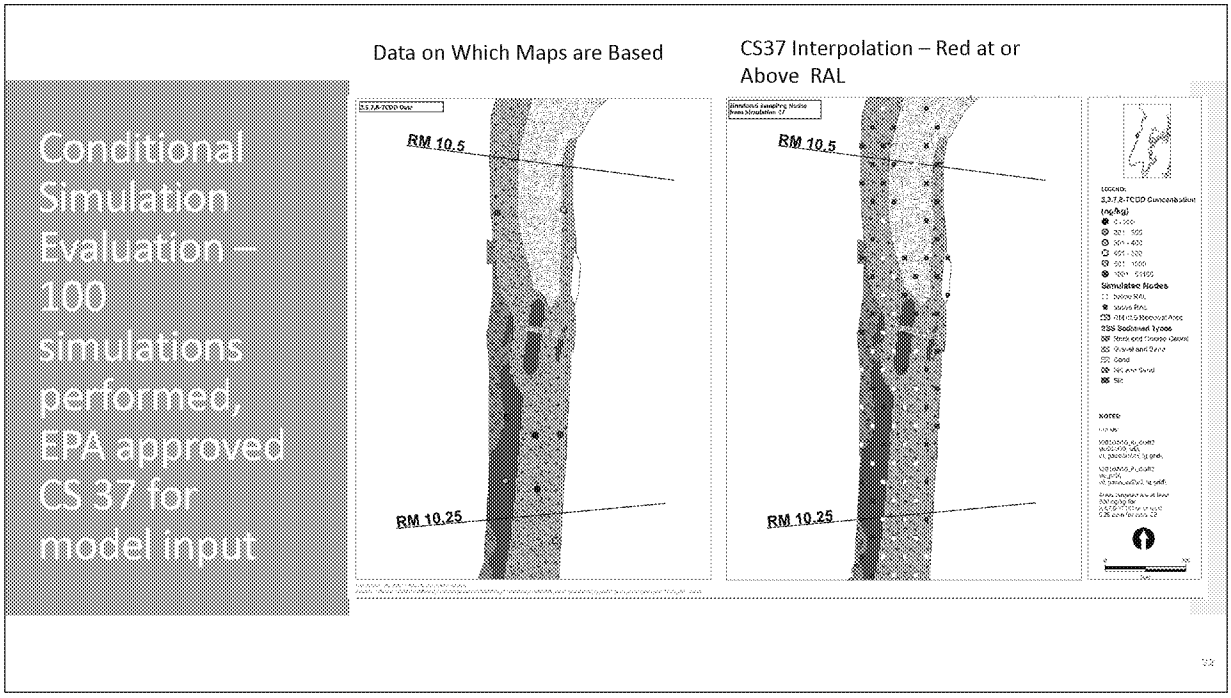
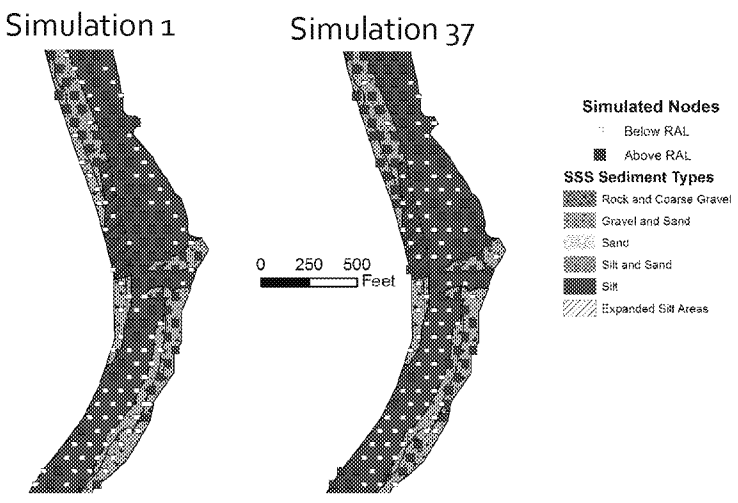
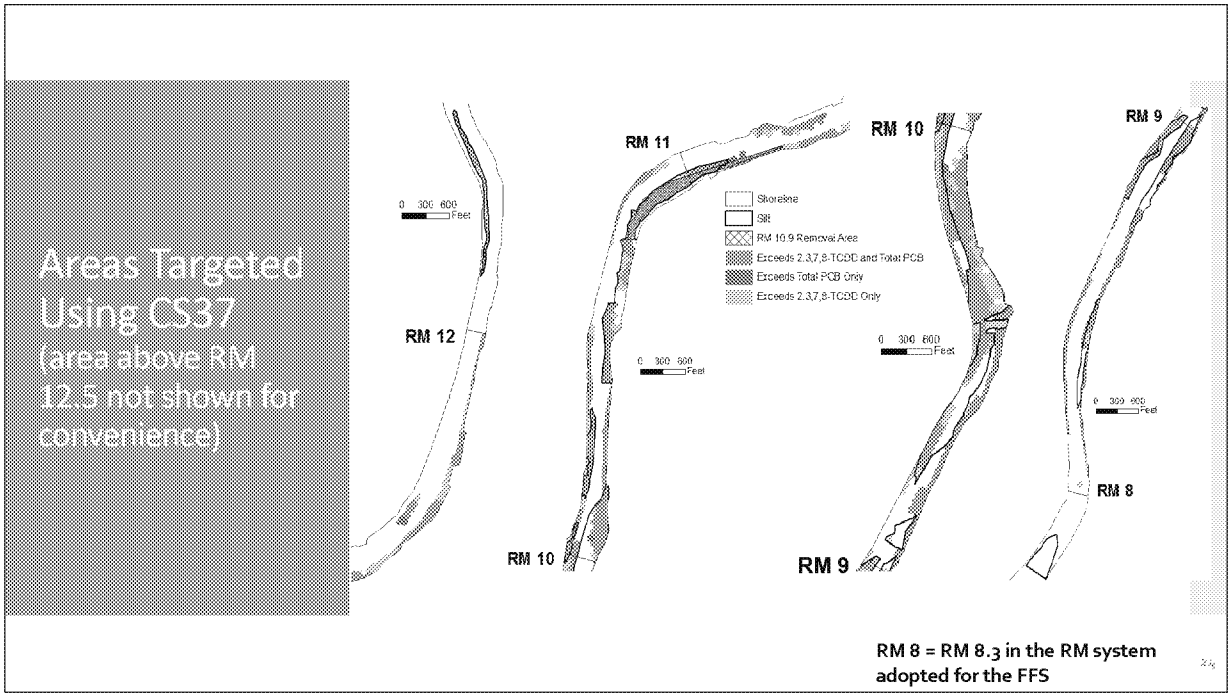


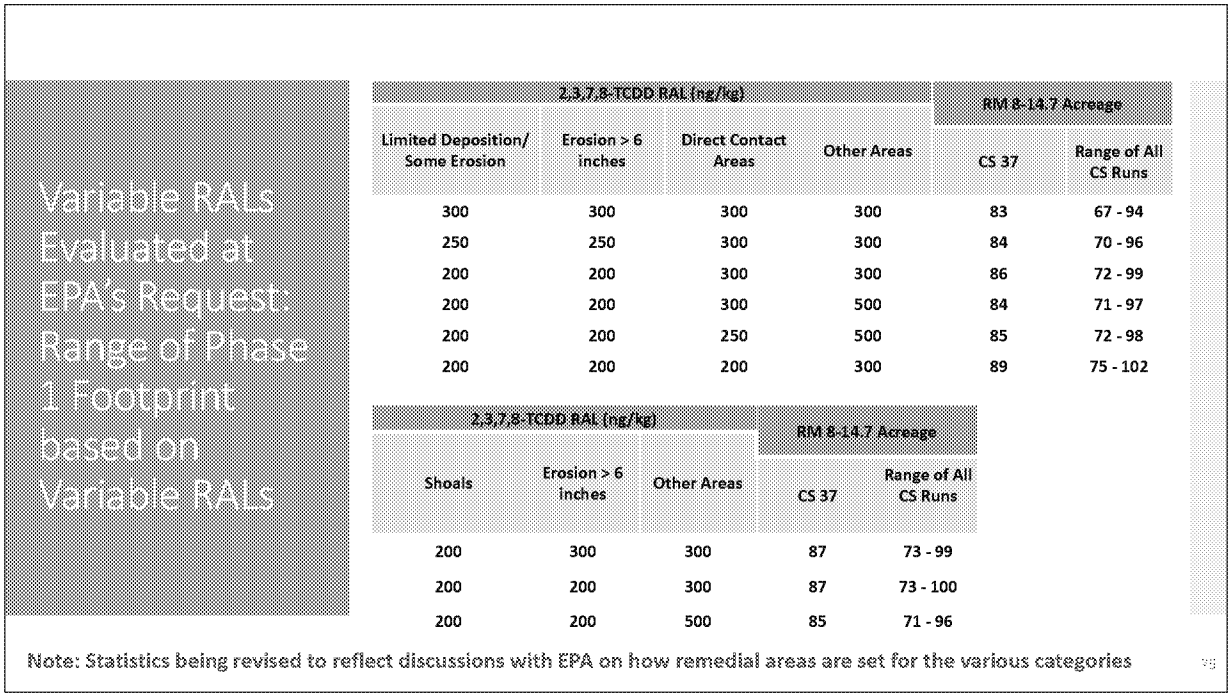
This plot highlights the uncertainty of the mapping in that it interpolates far from measured concentrations.

Each CS Yields a Different Map – High density pre-design sampling will reduce the uncertainty





This delineation gives a sense of where remediation would likely occur, but cannot be viewed as where delineation will occur. It is useful for assessing scope and relative effectiveness.



Reducing the 2,3,7,8-TCDD RAL to 250 or 200 ng/g does not provide much additional benefit.

Post-Remedy SWACs and Percent Reductions based on Variable RAL Evaluation

2,3,7,8-TCDD RAL (ng/kg)				RM 8 – 14.7				RM 8 – 17.4			
				2,3,7,8-TCDD		Total PCB		2,3,7,8-TCDD		Total PCB	
Limited Deposition/ Some Erosion	Erosion > 6 inches	Direct Contact Areas	Other Areas	SWAC	Percent Reduction	SWAC	Percent Reduction	SWAC	Percent Reduction	SWAC	Percent Reduction
300	300	300	300	84	91.5	0.30	79.7	62	91.5	0.29	74.7
250	250	300	300	82	91.7	0.30	80.0	60	91.7	0.29	75.0
200	200	300	300	79	92.0	0.29	80.4	62	91.5	0.29	74.7
200	200	300	500	87	91.2	0.30	79.8	64	91.2	0.29	74.8
200	200	250	500	82	91.7	0.29	80.2	60	91.7	0.29	75.2
200	200	200	300	71	92.8	0.28	81.2	52	92.8	0.28	76.2

2,3,7,8-TCDD RAL (ng/kg)			RM 8 – 14.7				RM 8 – 17.4			
			2,3,7,8-TCDD		Total PCB		2,3,7,8-TCDD		Total PCB	
Shoals	Erosion > 6 inches	Other Areas	SWAC	Percent Reduction	SWAC	Percent Reduction	SWAC	Percent Reduction	SWAC	Percent Reduction
200	300	300	70	92.9	0.28	81.1	52	92.9	0.28	76.0
200	200	300	70	92.9	0.28	81.1	51	92.9	0.28	76.1
200	200	500	74	92.6	0.29	80.6	54	92.6	0.28	75.6

All PCB results are below ROD background of >0.4 mg/kg

Note: Statistics being revised to reflect discussions with EPA on how remedial areas are set for the various categories

Reducing the 2,3,7,8-TCDD RAL to 250 or 200 ng/g does not provide much additional benefit.

Variable RAL Analysis Found No Significant Difference Between Alternatives

- Analysis Supports Use of 300 ng/kg RAL
  - 300 ng/kg RAL reduces concentrations more than ten-fold
  - Reducing RAL to 200 ng/kg in areas with certain characteristics achieves little additional benefit
    - Targets cores showing recovery potential
    - Produces unmeasurable changes in SWAC
      - mostly < 10 ng/kg
  - 300 ng/kg RAL is already conservative
    - Could raise to 400 ng/kg since water column concentrations 200 – 400 ng/kg

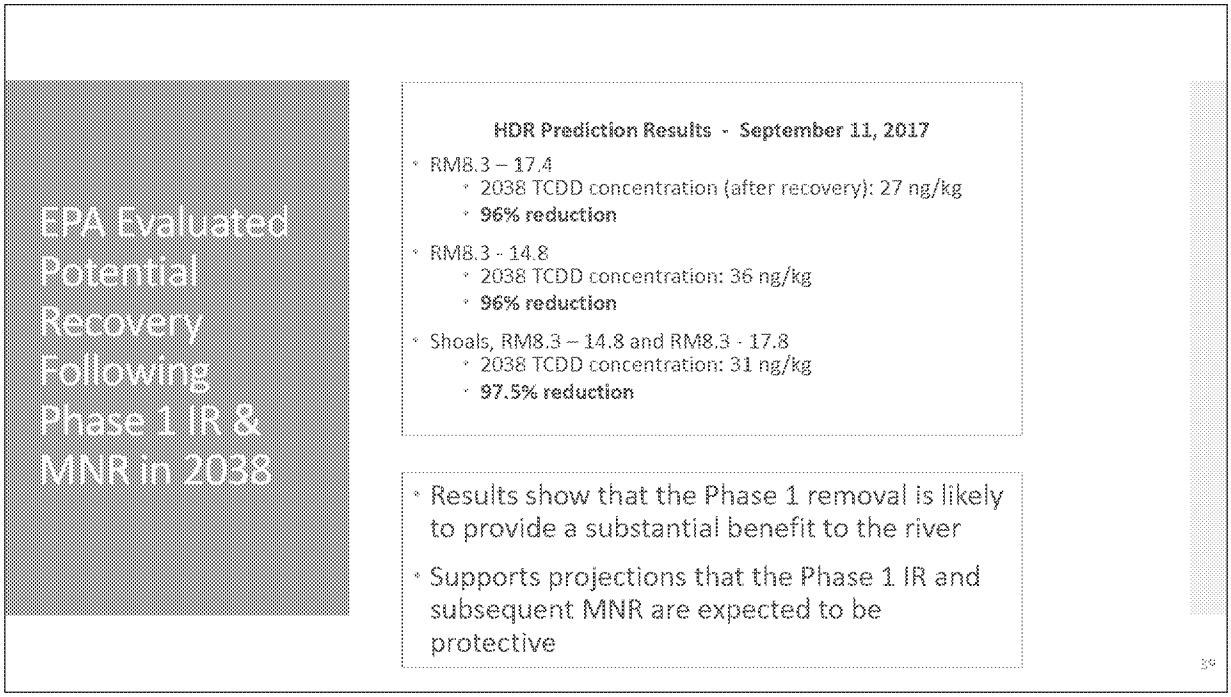
Current RI Data Limit the Ability of Identifying Flexible RALs

- Current RI data is insufficient to demonstrate the benefits of flexible RAL approach
- Flexible RAL options do little to reduce risk, but the increase in volume and cost are significant.
- PDI investigation will be designed to develop data set to improve models and allow a more robust evaluation of flexible RALs.
- Models suffice for FS level evaluation

Range of Post-Remediation SWACs Within Range of Data Uncertainties

- CS 37 is One of 100 Conditional Simulations
  - +/-25% for total footprint acreage
  - Final footprint will be based on PDI results
- Current data set and tools are not refined sufficiently to determine the difference between 40, 30, 20 or 10 ng/kg
- Numerous Uncertainties in Sediment to Tissue Relationships

- Post-Remediation/Recovery SWACs are equivalent within accuracy of data
- Only mechanism to evaluate effectiveness is to conduct Phase 1 Interim Remedy and monitor: Adaptive Management


EPA Evaluated Potential Recovery Following Phase 1 IR & MNR in 2038
HDR Prediction Results - September 11, 2017
RM8.3 – 17.4
2038 TCDD concentration (after recovery): 27 ng/kg
96% reduction
RM8.3 - 14.8
2038 TCDD concentration: 36 ng/kg
96% reduction
Shoals, RM8.3 – 14.8 and RM8.3 - 17.8
2038 TCDD concentration: 31 ng/kg
97.5% reduction
Results show that the Phase 1 removal is likely to provide a substantial benefit to the river
Supports projections that the Phase 1 IR and subsequent MNR are expected to be protective

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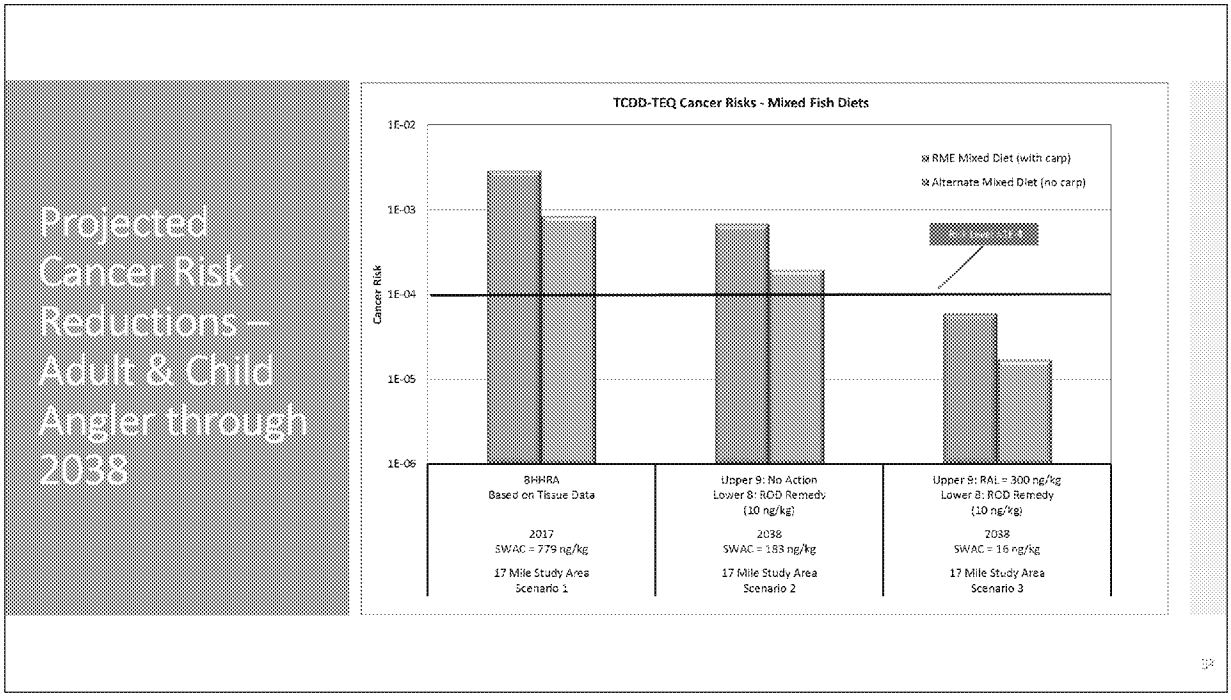
2,3,7,8-TCDD SWACs Used in Risk Reduction Calculations

Scenario Number	Scenario Description	2,3,7,8-TCDD SWAC (ng/kg)	Basis for TCDD Input
1	Current baseline conditions	779 ng/kg RM 0-17.4 SWAC	CPG Mapping of "2010" dataset (conditional simulation 37)
2	ROD remedy only (no action in the upper 9 miles)	183 ng/kg RM 0-17.4 SWAC	Area-weighted average of the following: • For lower 8 miles, EPA ROD model prediction for 2038 for preferred remedy, based on 2016 ROD report figures (10 ng/kg). • For upper 9 miles, EPA ROD model No Action simulation presented at the 9/11 Phase 1 meeting (511 ng/kg)
3	ROD remedy and Phase 1 IR & MNR - Impact on site-wide risk	16 ng/kg RM 0-17.4 SWAC	Area-weighted average of the following: • For lower 8 miles, EPA ROD model prediction for 2038 for preferred remedy, based on 2016 ROD report figures (10 ng/kg). • For upper 9 miles, EPA ROD model 2038 prediction for a 300 ng/kg 2,3,7,8-TCDD RAL in the upper river, presented at the 9/11 meeting (27 ng/kg)



This figure shows the projected reduction in site-wide dioxin fish consumption cancer risk from implementing the Lower 8 Miles ROD remedy and the Phase I interim remedy for the Upper 9 Miles. The risks were calculated using the reasonable maximum exposure assumptions for the angler from the final baseline human health risk assessment.

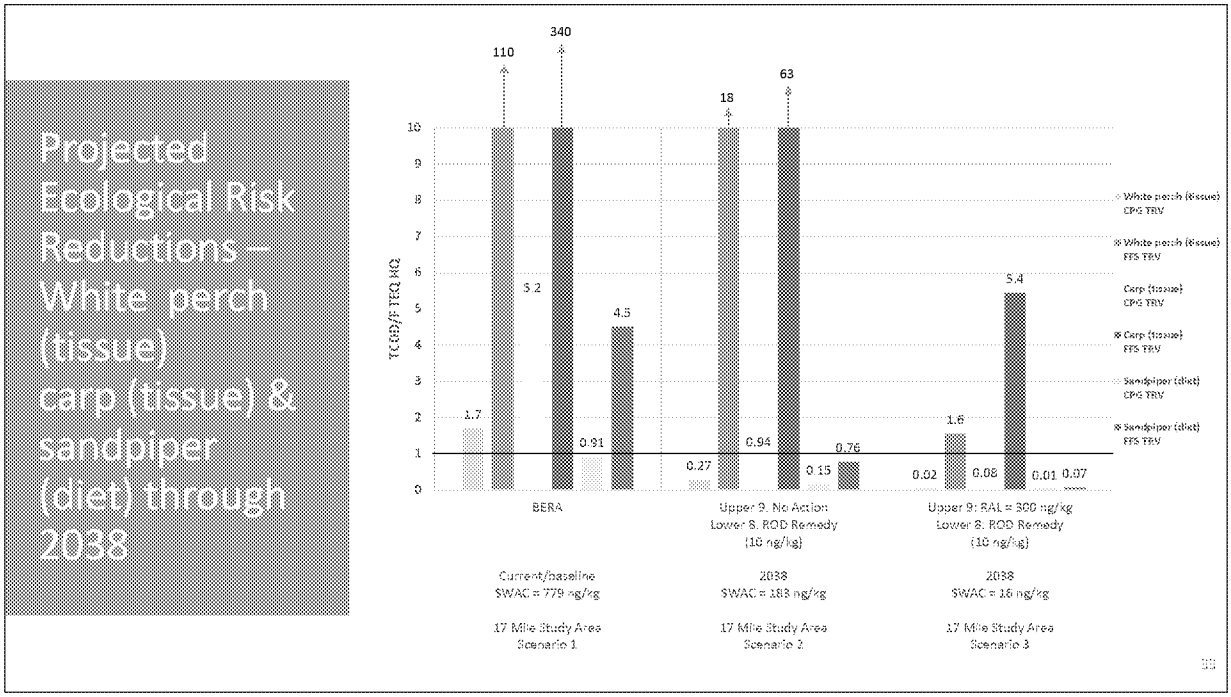
Scenario 1 shows current site-wide risks for a mixed fish species diet with or without carp. The fish consumption risks of 3 x 10-3 (with carp) and 8 x 10-4 (no carp) are based on the fish tissue data collected during the RI.

Scenario 2 shows projected post-remedy risks at Year 2038 for the 17-mile Study Area after implementing the Lower 8 miles ROD remedy. The analysis assumes a proportional relationship between sediment and fish tissue concentrations. Dioxin risks are reduced by 77% from current risks, but still exceed the NCP target risk of 10-4.

Scenario 3 shows projected post-remedy risks at Year 2038 for the 17-mile Study Area after implementing the Lower 8 Miles ROD remedy and the Upper 9 Miles interim remedy. Dioxin risks are reduced by 98% and are below the NCP target risk of 10-4.

Other exposure pathways (direct contact with sediment and surface water) are minor contributors to cumulative site risk, and post-remedy risk would still be below 10-4 if these potential exposure pathways are included.

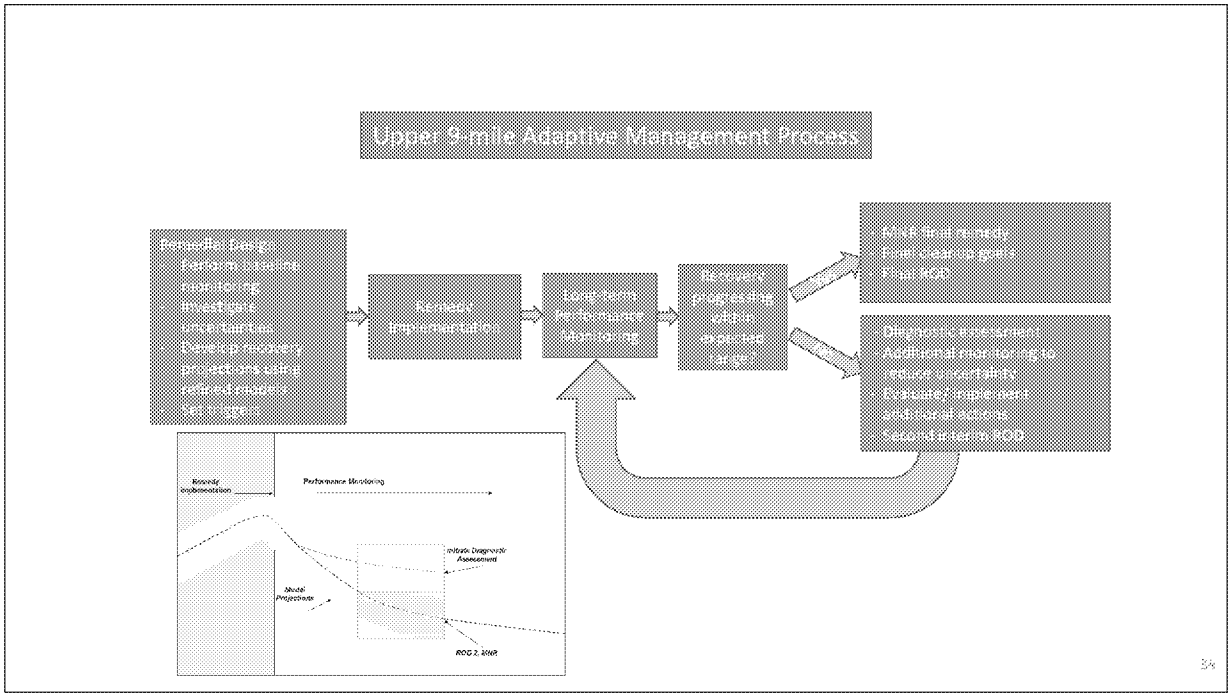
The above estimates reflect mixed fish species exposed to a whole-river sediment average; they will be revised to reflect the exposure likely from the species specific home range when the models are finalized.



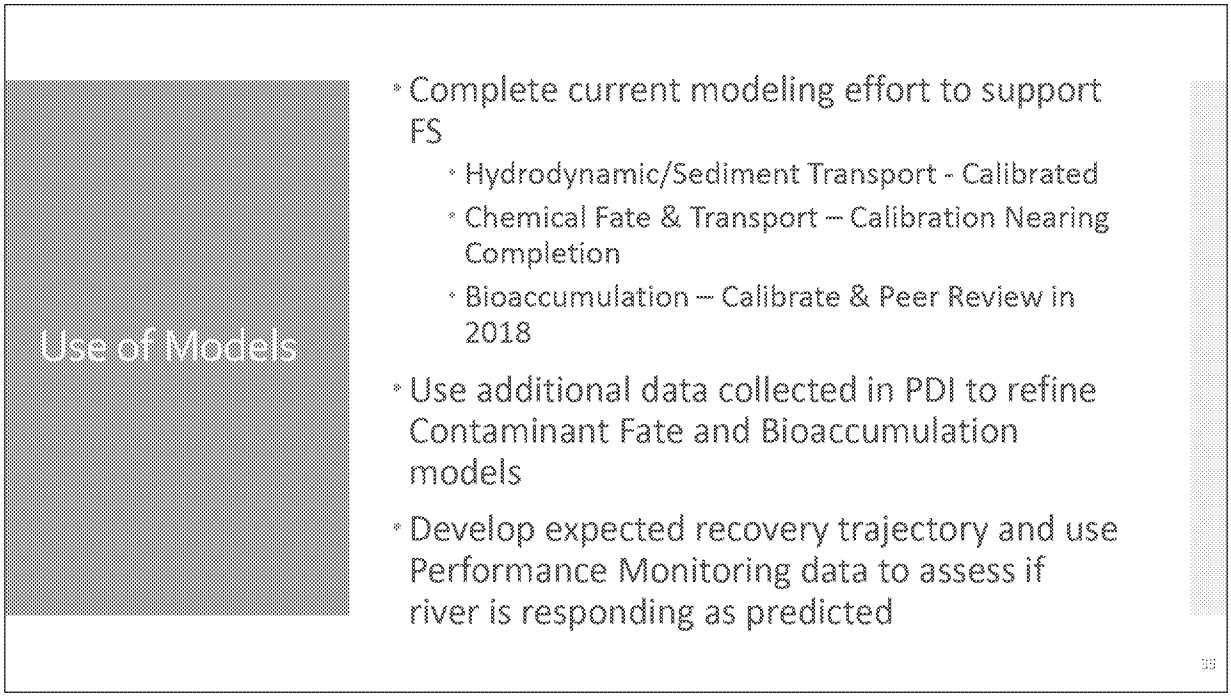
For Scenario 2, HQs were reduced by 84% for white perch (tissue), 82% for carp (tissue), and 83% for sandpiper (diet). HQs were < 1 for Scenario 2, with the exception of white perch (HQ = 18) and carp (HQ = 63) using FFS TRVs.

For Scenario 3, HQs were reduced by 99% for white perch (tissue), 98% for carp (tissue), and 99% for sandpiper (diet). HQs were < 1 for Scenario 3, with the exception of white perch (1.6) and carp (5.4) using FFS TRVs.

The above estimates reflect ecological receptors exposed to a whole-river sediment average; they will be revised to reflect the exposure likely from the species specific home range when the models are finalized.



This is a summary of the adaptive management process. During the RD, model projections will be refined based on the baseline and PDI data. Triggers for additional assessment will be defined based on the refined model projections, and will include an expected range of recovery to account for uncertainty in the projections. If the remedy progresses as expected, final clean up goals will be established and a final ROD will be issued. If the remedy is not progressing within the expected range, additional assessment and actions will be performed, as appropriate, and a second interim ROD will be released.


Use of Models
Complete current modeling effort to support FS
Hydrodynamic/Sediment Transport - Calibrated
Chemical Fate & Transport – Calibration Nearing Completion
Bioaccumulation – Calibrate & Peer Review in 2018
Use additional data collected in PDI to refine Contaminant Fate and Bioaccumulation models
Develop expected recovery trajectory and use Performance Monitoring data to assess if river is responding as predicted

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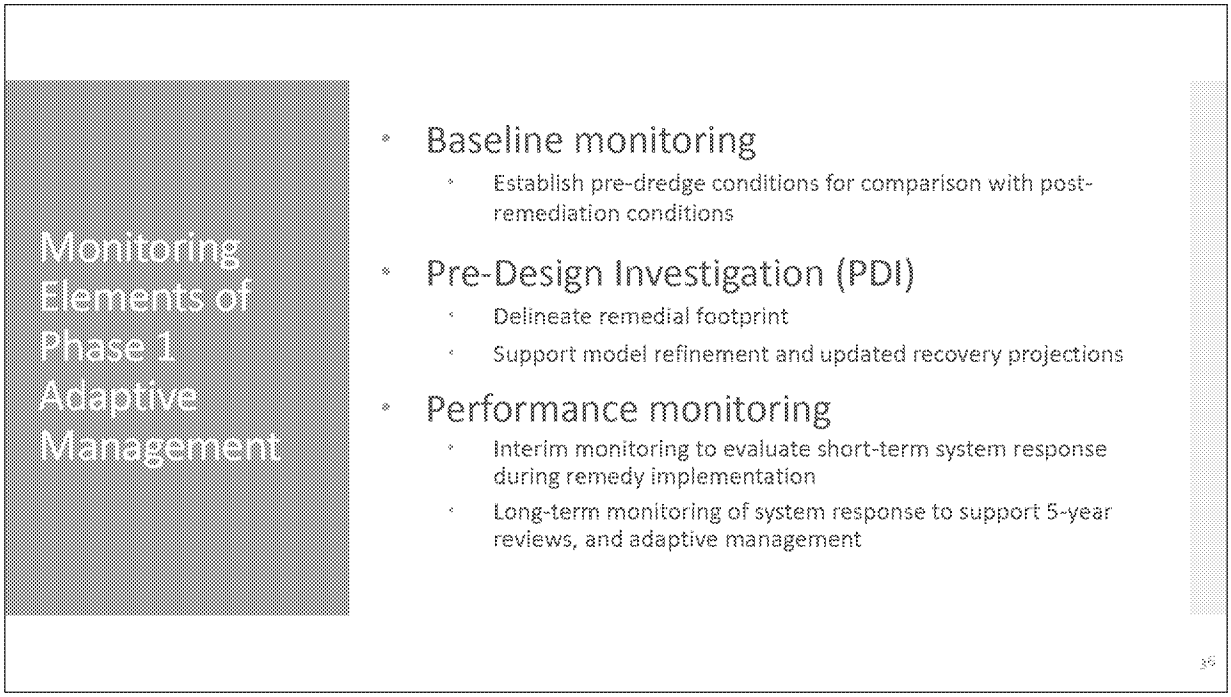
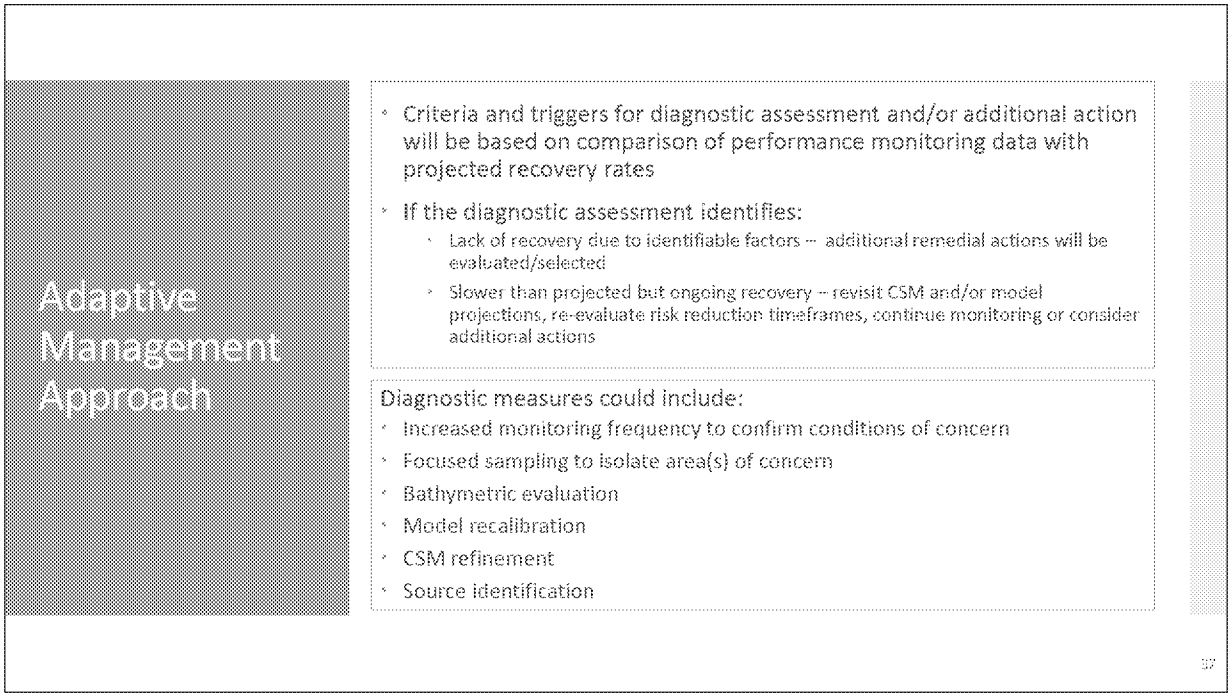
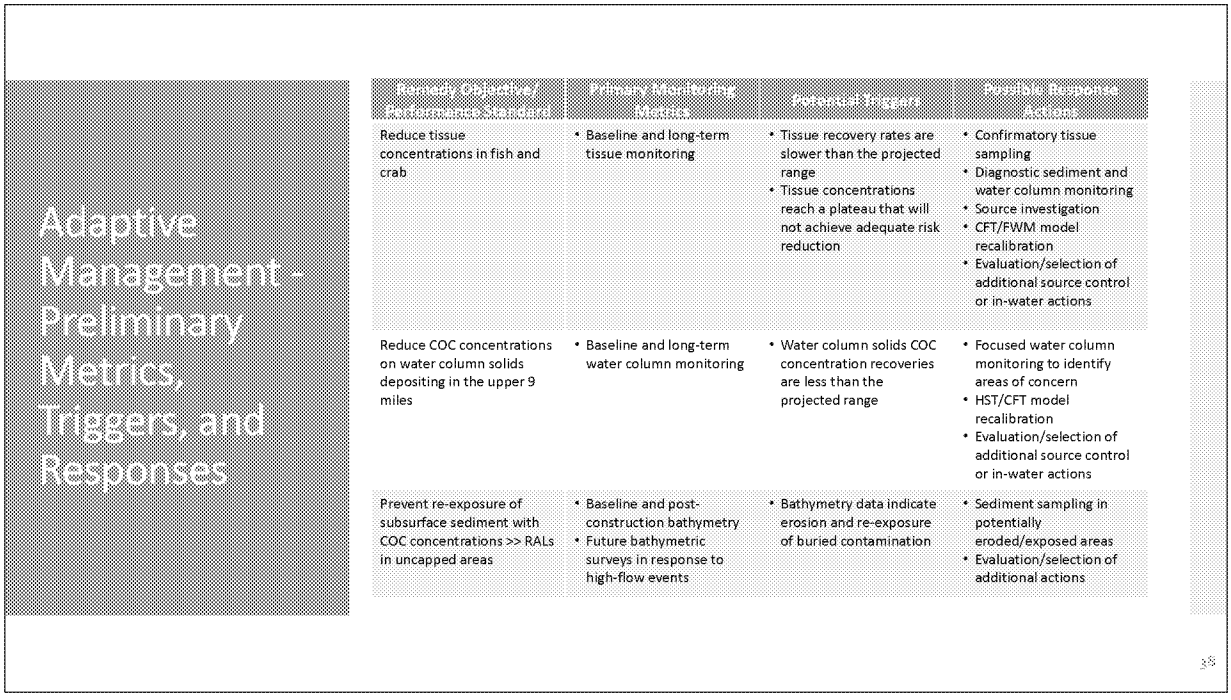


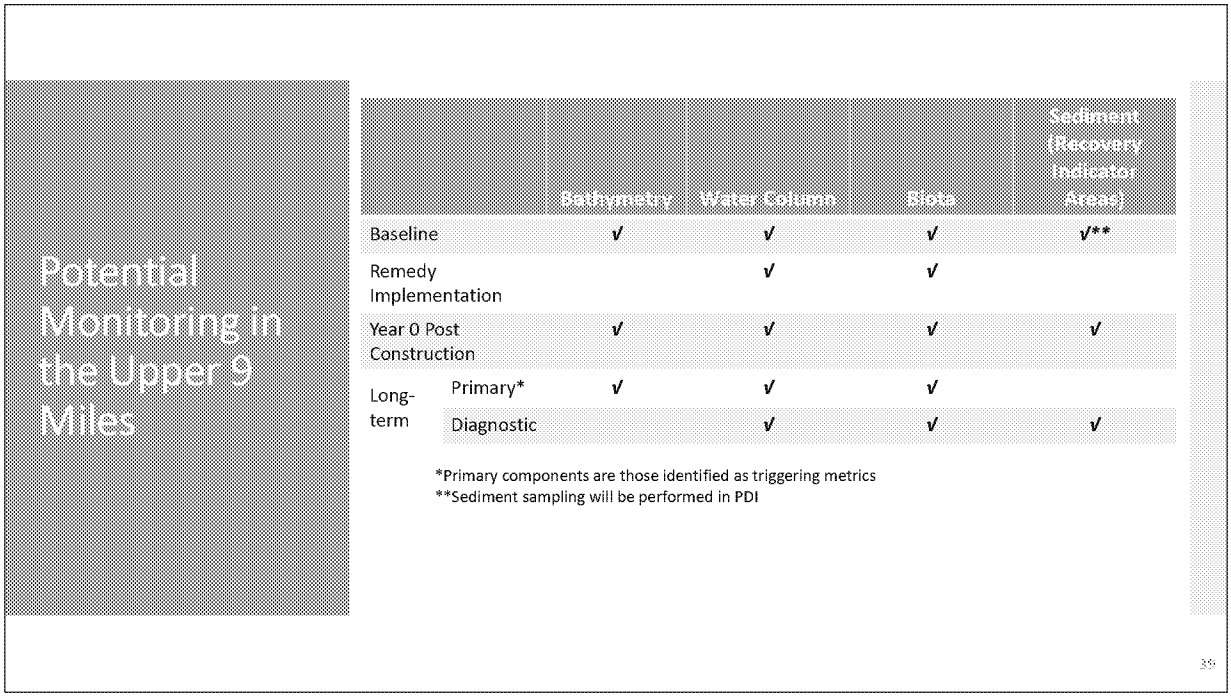
These are the monitoring elements that will provide data specifically to support the adaptive management evaluations (i.e., construction monitoring and cap performance monitoring are not included in the adaptive management presentation but will be part of the complete monitoring program). Monitoring programs will be designed with clearly articulated data use objectives to ensure that data are collected with sufficient temporal and spatial resolution to monitor remedy performance.



The monitoring plan to support adaptive management will be developed during the remedial design. The plan will include projections of risk reduction and associated time frames. Post-remedy monitoring data will be compared to projections and defined triggers to assess recovery progress. If triggered, a diagnostic assessment will be performed with additional data collection and/or evaluations to understand why recovery is not proceeding as anticipated. If the diagnostic assessment concludes that additional remedial actions are needed to achieve risk reduction goals, a focused feasibility study or other evaluation will be performed to identify an evaluate additional actions.

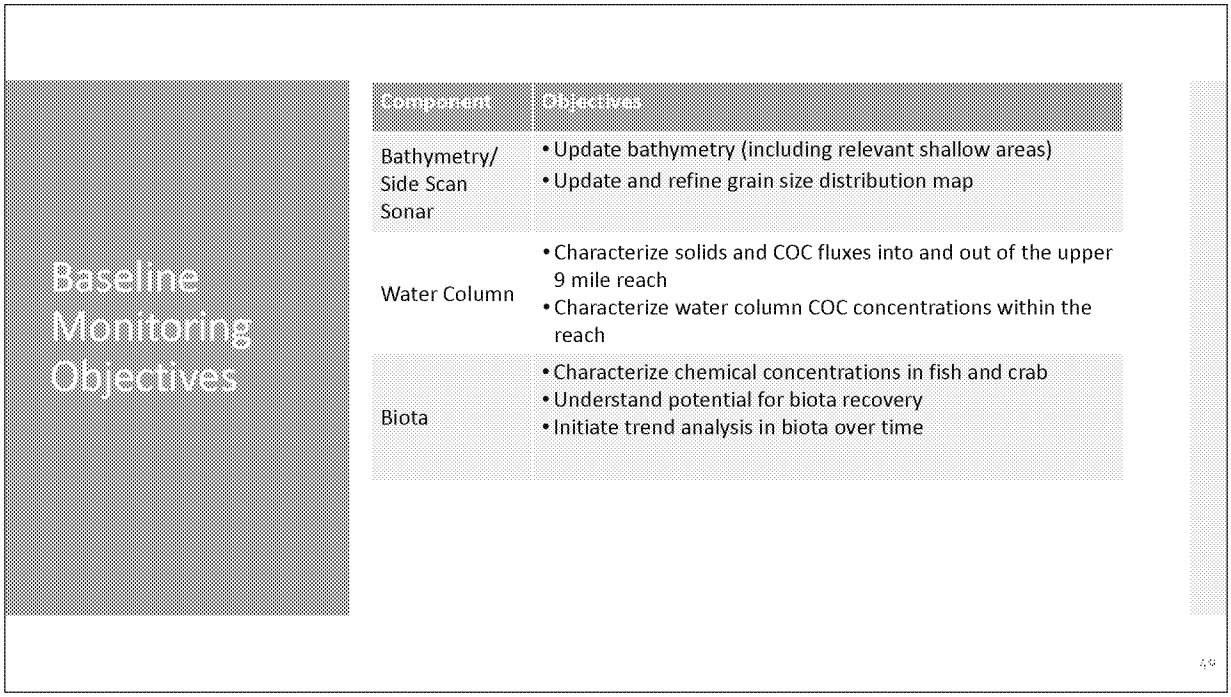


A well-defined set of metrics, triggers, and response actions will support the adaptive management approach. The set of remedy objectives/performance standards are based on the CSM for the upper 9-miles; specifically, they are derived from the current understanding of how recovery is expected to occur following remedial actions. For each objective/performance standard, one or more monitoring metrics and triggers will be defined. Numerical values for each trigger will be specified. Depending on the results of the monitoring and which values are triggered, one or more response actions will be performed.

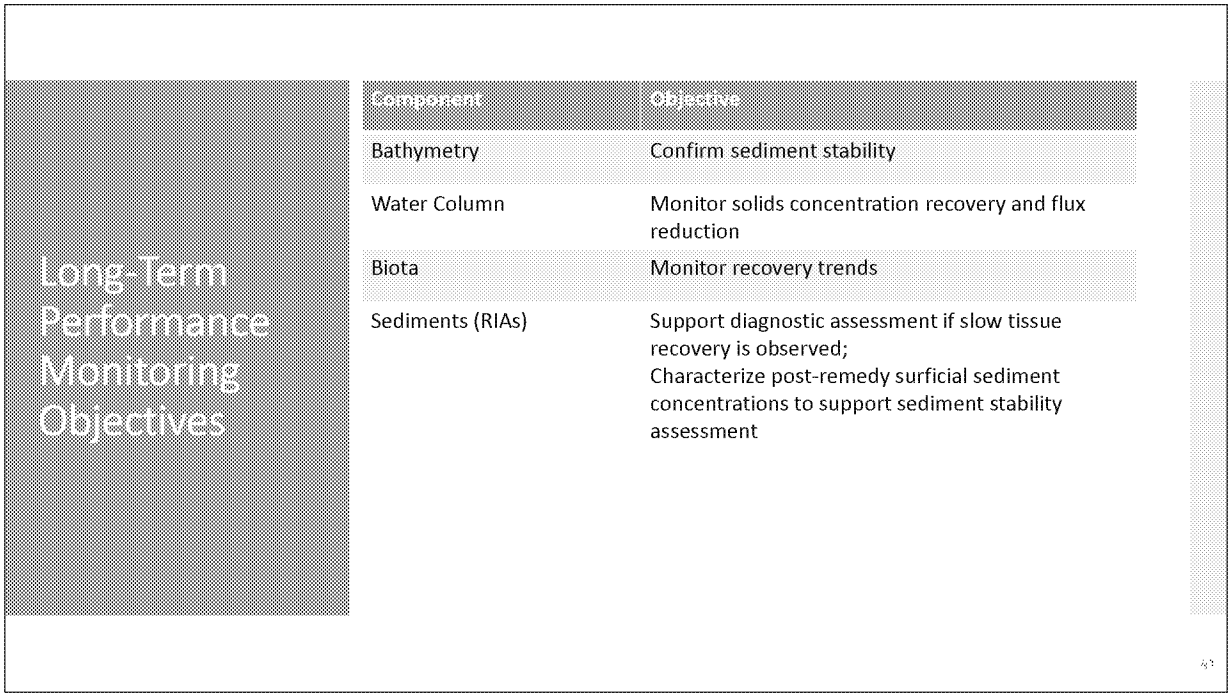


The components of the monitoring will be deployed to achieve the specified data use objectives of the adaptive management plan. Specifically, the primary monitoring components will be performed on a defined schedule (water column and biota) and/or by a defined event (bathymetry following a high flow event). The frequency and spatial coverage will be sufficient to monitor remedy performance and identify significant deviations from expected performance. The diagnostic components will be performed as needed.

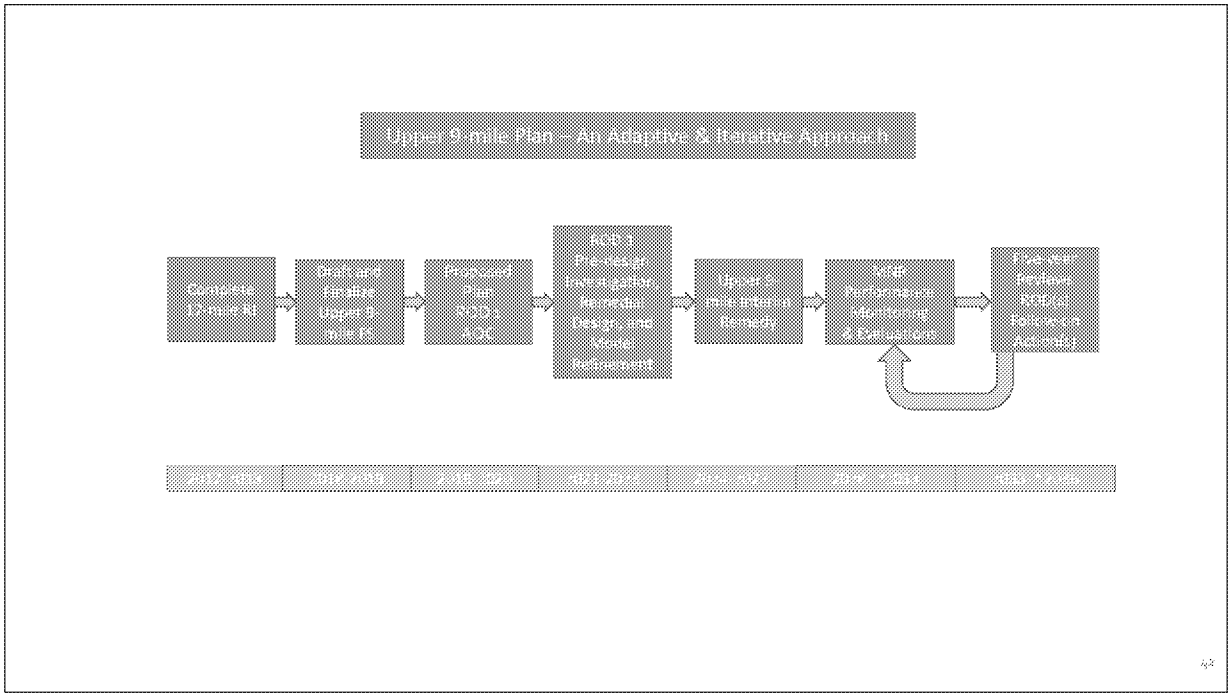
Sediment Recovery Indicator Areas (RIAs) will be identified for sediment sampling, both within and outside of active remediation areas, where there is an expectation of response based on the CSM (e.g., depositional and net neutral areas). Incremental sampling will be performed within the RIAs to support characterization of temporal changes in surficial sediment concentrations.



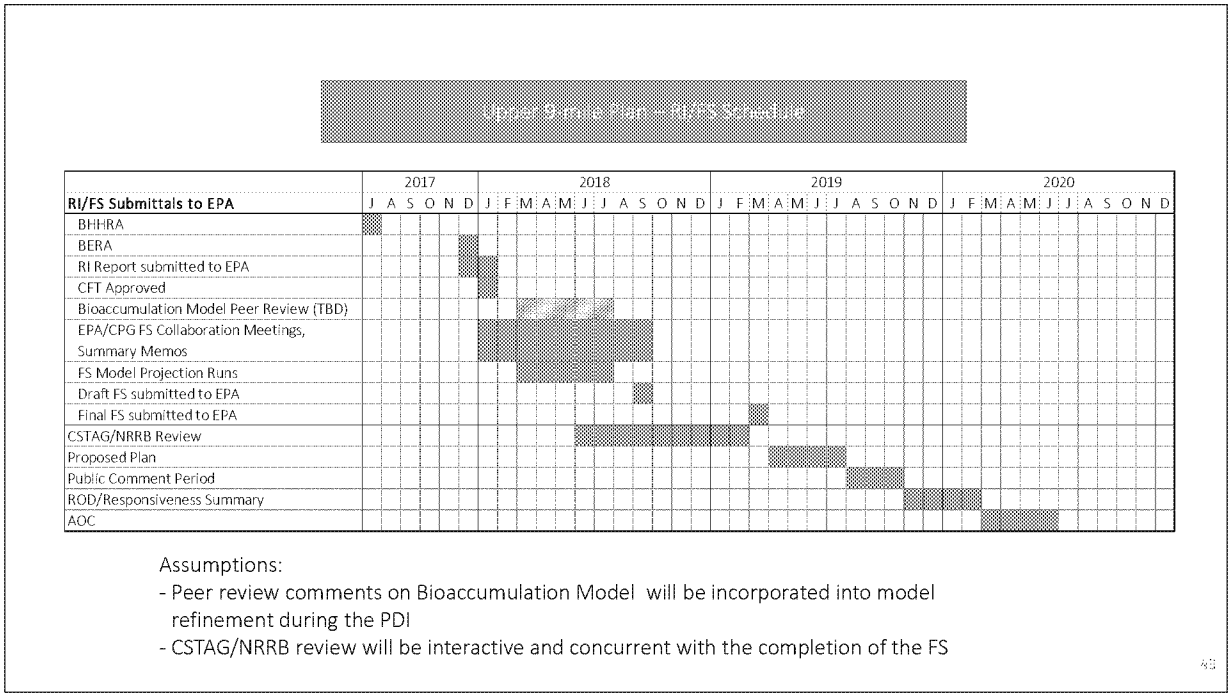
Data use objectives for the monitoring program will be clearly articulated so that the appropriate data collection is performed. Baseline data, which will be collected over multiple years, will provide an updated characterization of the upper 9 miles. Sediments will be sampled as part of the PDI, and will support any baseline needs.



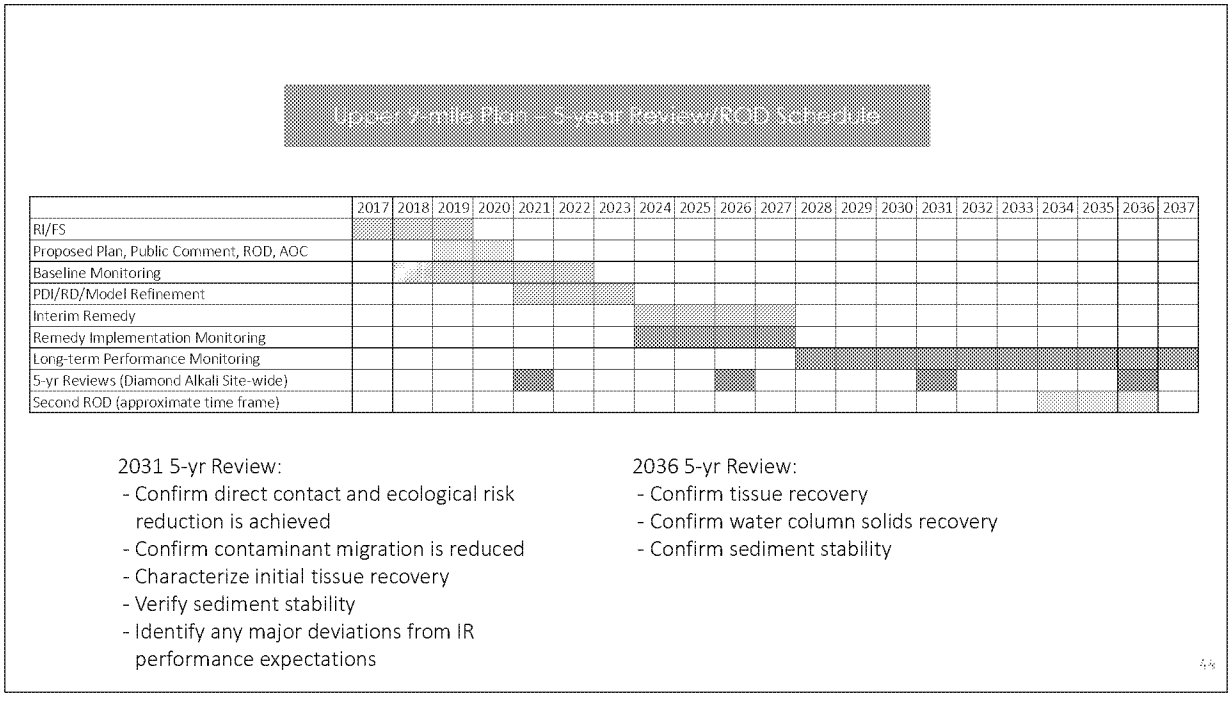
Long-term performance monitoring data will be used to assess remedy performance, and, if necessary, evaluate deviations from expected performance.



Overview of schedule.
General assumptions:
- Estimated RA time assumes proposed remedy (~80 acres)
- Collaborative meetings with EPA and CPG to discuss and resolve key FS issues and to streamline the FS memo process.
- Proposed Plan can be drafted concurrently with the completion of the FS to expedite release.



Collaboration between EPA and CPG will result in expedited deliverables and revisions leading to approvable documents, and support release of the Proposed Plan soon after the completion of the FS.
CPG proposes periodic briefings with NRRB/CSTAG during the FS to address concerns and incorporate documents during the completion of the FS.

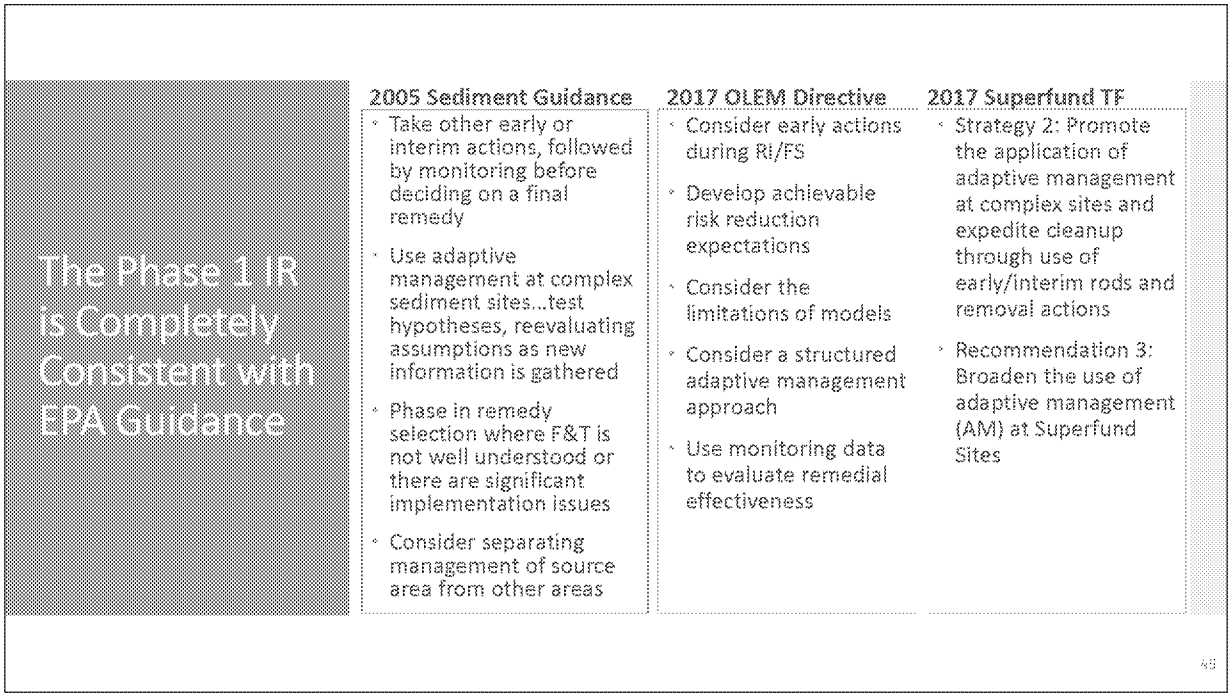


Duration of PDI/RD and RA estimated.

Timing of RD and RA allows for coordination with lower 8-mile remedy (based on available information on lower 8-mile remedy schedule)

It is anticipated that major deviations from remedy performance expectations will be evident in the initial years of long-term monitoring.

The timing of the second ROD will depend on the results of the monitoring. If recovery is proceeding as expected, the second ROD will be the final ROD, and include numeric PRGs.



Upper 9-Mile Interim Remedy is consistent EPA Guidance and Directives

CPG's Proposal for an Upper 9-Mile Phase 1 IR

- Phased approach to address the Upper 9-Miles using Adaptive Management
- Proposed RAL of 300 ppt (ng/kg) TCDD and 1 ppm (mg/kg) of Total PCBs
- Approximately 80 Acres from RM 8.3 to RM 14.7
- Remedial Footprint will be reassessed after the PDI
- Performance Monitoring will be used to determine whether the Phase 1 IR and MNR are sufficient and ROD 2 can codify the final cleanup levels, or whether additional actions are required to achieve protectiveness

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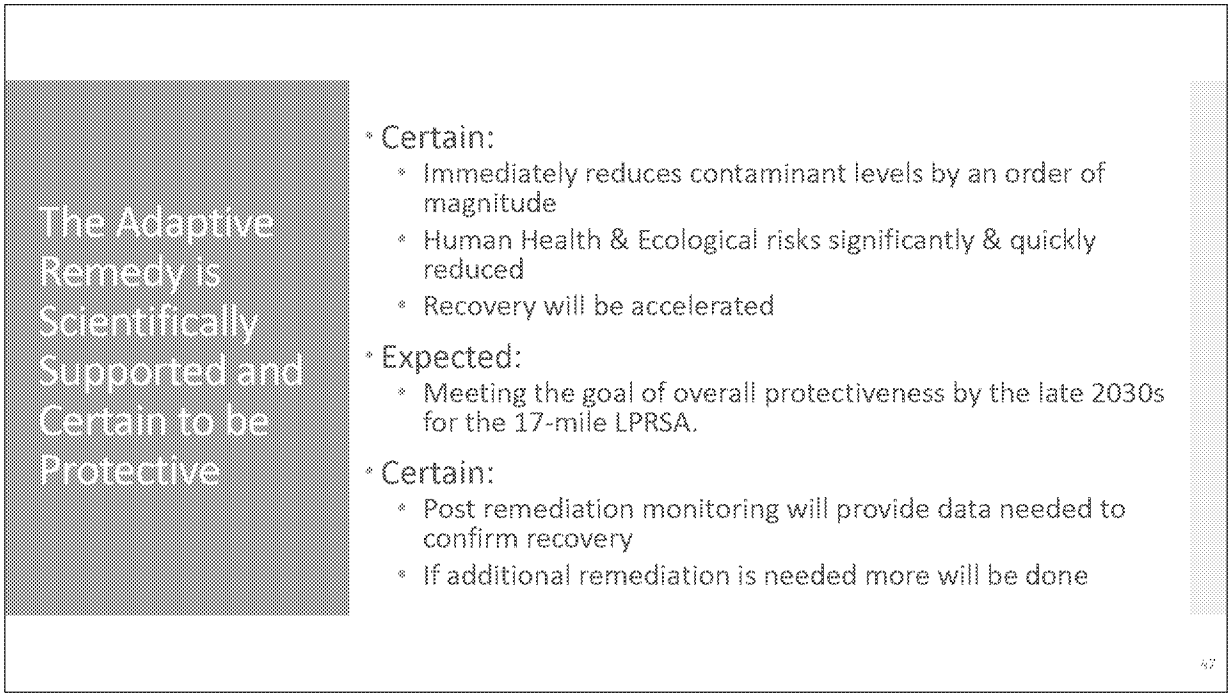

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